

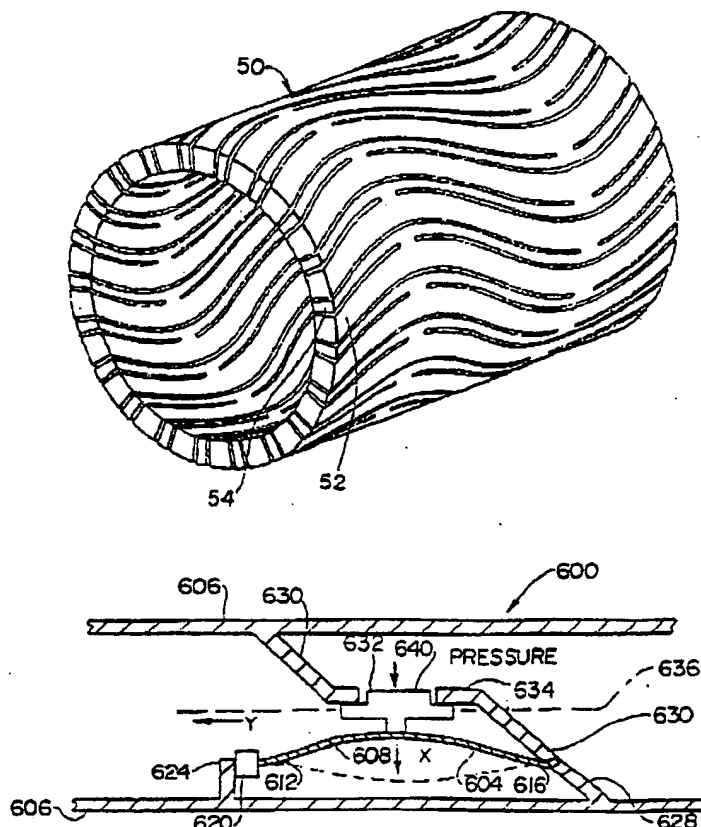


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup>:</b> <b>A61F 2/06, A61B 17/11,</b> <b>A61F 2/00, F16K 31/00</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 98/32412</b> <b>(43) International Publication Date:</b> 30 July 1998 (30.07.98)
<b>(21) International Application Number:</b> PCT/US98/01310 <b>(22) International Filing Date:</b> 23 January 1998 (23.01.98)  <b>(30) Priority Data:</b> 60/036,359      24 January 1997 (24.01.97)      US  <b>(71) Applicant (for all designated States except US):</b> SCIMED LIFE SYSTEMS, INC. [US/US]; One SciMed Place, Maple Grove, MN 55311-1566 (US).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BESSELINK, Petrus, Antonius [NL/NL]; Gronausestraat 1220, NL-7534 AT Enschede (NL).  <b>(74) Agents:</b> ARRETT, Oliver, F. et al.; Vidas, Arrett & Steinkraus, Suite 2000, 6109 Blue Circle Drive, Minnetonka, MN 55343-9131 (US).	<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>  <b>(88) Date of publication of the international search report:</b> 12 November 1998 (12.11.98)	

**(54) Title:** BISTABLE SPRING CONSTRUCTION FOR A STENT AND OTHER MEDICAL APPARATUS**(57) Abstract**

The present invention is directed to bistable cells and their use in devices, particularly medical devices such as stents, clamps and valves. An expandable stent formed of a plurality of bistable cells is described. The stent has two or more stable configurations, including a first stable configuration with a first diameter and a second stable configuration with a second, larger diameter. A valve comprising a bistable cell for use in eliminating incontinence is also disclosed.



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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/01310

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61F2/06 A61B17/11 A61F2/00 F16K31/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61F A61B F16K F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 18359 A (FOUERE) 20 June 1996  see abstract; figures 1,2 ---	1,11-13, 17-21, 28-33
X	WO 95 09584 A (GUERBET) 13 April 1995	1,11-13, 21, 28-33, 55-57 58
Y	see page 9, line 26 - page 10, line 12; figures ---	
X	WO 96 09013 A (WAKE FOREST INIVERSITY) 28 March 1996 see abstract; figures 10,14 ---	1,11-13, 30-33
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

4 September 1998

Date of mailing of the international search report

16.09.98

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NL - 2280 HV Rijswijk

Tel: (+31-70) 340-2040 - Tx: 31-651 epo-nl;

Fax: (+31-70) 340-3016

Authorized officer

Neumann, E

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International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 562 690 A (GREEN ET AL) 8 October 1996	1,54
A	see column 5, line 36 - column 7, line 13; figures 1-8	7,8
P,X	US 5 695 516 A (FISCHELL ET AL.) 9 December 1997	1,9, 11-13, 15,16, 28-33
A	see the whole document	2-4
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A	EP 0 364 787 A (EXPANDABLE GRAFTS PARTNERSHIP) 25 April 1990 see column 1, line 25 - line 50; figures	37-39,65
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In: International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 4 994 071 A (MACGREGOR DAVID C) 19 February 1991 see column 3, line 54 - column 4, line 18; figures ---	52
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A	see column 12, line 36 - line 42 ---	75
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# INTERNATIONAL SEARCH REPORT

International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 169 515 A (LIFELINE LTD) 16 July 1986 see the whole document	73
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 98/01310

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 48-50 60-64 72  
because they relate to subject matter not required to be searched by this Authority, namely:  
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
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### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 98/01310

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-36, 54-58

A medical device containing at least one unit cell with one relatively flexible segment and one relatively rigid segment

1.1 Claims 1,2,5-29

A unit cell with symmetrical load-displacement

1.2 Claims 1,3,5-29

A unit cell with asymmetrical load-displacement characteristic, most stable in expanded state

1.3 Claims 1,4-29

A unit cell with asymmetrical load-displacement characteristic, most stable in collapsed state

1.4 Claims 30-36

A medical device with a multistable spring system

1.5 Claim 1,54

A clamp

1.6 Claims 55-58

A graft stent with expansion rings

2. Claims: 37-47,65

A stent with a negativ spring constant

3. Claim : 51

A stent with a plurality of diameters

4. Claims: 52, 53

An expandable device

5. Claim : 59

A stent with wavelike members



# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 98/01310

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

6. Claims: 66-71

A bistable valve

7. Claims: 73-77

A medical device with a cell with four rigid segments

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int .tional Application No

PCT/US 98/01310

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